APPLICATION FOR PATENT

of

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for

METHOD FOR MANUFACTURING A ROBUST TETHERED BALL

This application is a continuation of United States Patent No. 10/319,398 filed December 12, 2002, by Wilson for METHOD FOR MANUFACTURING A ROBUST TETHERED BALL and United States Patent Application No. 09/563,305 filed May 2, 2000, by Wilson for METHOD FOR MANUFACTURING A ROBUST TETHERED BALL, which applications are hereby fully incorporated by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention is in the field of sporting goods and specifically it relates to a method for producing a composite article that includes a ball and an elastic tether. In a preferred embodiment, the ball has the size and shape of a baseball, and sounds like a baseball when struck by a bat.

The Prior Art

In the United States, baseball has been a popular sport for well over a century, and so it is not surprising that a very large number of patents have been granted for batting practice devices. These devices are intended to permit a sole individual to perfect his swing without the need to retrieve each ball that is hit. To cause the ball to return to the vicinity of the batter, it is known to tether the ball to a stationary object, such as an upstanding post,

a horizontal arm, or other structure.

A serious problem with such batting practice devices is that they cannot successfully withstand a large number of hits. Depending on the specific apparatus, the tether may come loose from the ball, the tether may become damaged and eventually break, or the ball may disintegrate. The use of metal parts, such as a screw eye, is undesirable because of the likelihood of damaging the bat.

After much investigation, it appeared to the present inventor that the problem of producing a truly robust tethered baseball had still not been solved. Accordingly, the inventor embarked on a lengthy program of experimentation in which alternative approaches were tried and the articles produced were tested to destruction. Not only should the tethered ball be able to survive thousands of hits, but also the sound made when the bat strikes the ball should simulate the sound of a real bat striking a real baseball. Finally, the optimum product should be manufacturable in quantity.

SUMMARY OF THE INVENTION

The objective of the present invention is to provide a process for manufacturing in quantity, from presently available materials, an article that includes a robust ball robustly attached to a robust tether.

A further objective is to produce a tethered ball that when struck by a baseball bat produces a sound that closely resembles the sound made when a real baseball is struck by a bat.

In accordance with the present invention, a length of elastic shock cord, also known as bungee cord or stretch cord, is used for the tether. The shock cord includes a core of rubber threads enclosed within one or more layers of braided nylon. In the preferred embodiment, the core of the shock cord is approximately one-half inch in diameter and is surrounded by a single layer of braided nylon.

An anchor is formed at one end of the tether by folding an end portion of the tether back upon the remainder of the tether and fastening the end portion to the remainder

through the use of a hog ring.

Next, the end of the tether on which the anchor has been formed is inserted into a mold that will be used for producing the ball. The mold includes a lower part and an upper part, which are clamped together with the tether held between them. Each part of the mold includes a hemispherical cavity.

A liquid composed of an activated urethane is poured into the mold, where the chemical reaction that has already been activated continues, producing a high density urethane foam. After about 30 minutes, the mold is opened, the ball and tether are removed from the mold, and any rough edges are trimmed off. Thereafter, the ball and tether are permitted to rest for about 24 hours to be sure of 100 percent cure.

The novel features which are believed to be characteristic of the invention, both as to organization and method of operation, together with further objects and advantages thereof, will be better understood from the following description considered in connection with the accompanying drawings in which a preferred embodiment of the invention is illustrated by way of example. It is to be expressly understood, however, that the drawings are for the purpose of illustration and description only and are not intended as a definition of the limits of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the shock cord used for the tether, after the anchor has been formed at one end of the shock cord;

FIG. 2 is a cross sectional side elevational view of the lower part of the mold;

FIG. 3 is a cross sectional side elevational view of the lower part of the mold after the prepared tether has been placed in it.

FIG. 4 is a cross sectional side elevational view of the mold showing the upper part of the mold in place;

FIG. 5 is a perspective view showing the article produced by the method of the present invention after it has been removed from the mold; and,

FIG. 6 is a flow chart showing the steps followed in the method of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The first step in making the tethered ball is to cut the tether to a desired length. In a preferred embodiment of the invention, the tether is composed of a length of elastic shock cord, also known as bungee cord or stretch cord. In the preferred embodiment, the cord is manufactured by the HNW Company of North Vale, New Jersey, and is designated as their 0.5 inch single nylon cover bungee cord. Figure 1 shows the length of cut shock cord. It includes a core 12 consisting of a bundle of strands of rubber. The core 12 is surrounded by an inner layer 14 of braided nylon, which, in turn is surrounded by an outer layer 16 also of braided nylon. The use of an electric hot knife is advisable for cutting the shock cord because it seals the edges of the nylon braid, thereby resisting unraveling. An end portion 18 is bent back 180 degrees, so as to lie against the remainder 20 of the length of cord, and the end portion 18 is secured in that position by affixing a No. 2 hog ring 22. The diameter and stiffness of the shock cord used in the preferred embodiment make it impractical to tie a knot at the end of the tether. Also, the size of the knot would make the ball weaker because the ball would consist of less foam material. In an alternative embodiment the folded back end portion 18 is lashed to the remainder 20 of the tether by a strong cord or wire. The folded back end portion 18 forms an anchor 23 that helps to prevent the tether from becoming detached from the ball in use. This completes step 24 of Figure 6.

The ball 26 is formed by a molding process. For this purpose, a mold, best seen in Figure 4 is used. The mold includes a lower part 28, an upper part 30, and a plug 32. The lower part and upper part of the mold include respectively portions 34 and 36 that closely surround and sealingly engage the outer layer 16 of the tether.

Figure 2 shows the lower part 28 of the mold. It includes a hemispherical cavity 38 that defines the size and shape of the ball. To help the ball to cure more evenly,

the mold is preheated to a temperature between 80°F and 100°F. A household electrical bread warmer works well for this purpose. Next, both halves of the spherical cavity of the mold are sprayed with a silicone mold release liquid and immediately, the prepared shock cord is positioned in the mold as shown in Figure 3 with the anchor portion 23 centrally located within the mold. Immediately, the upper part 30 of the mold is clamped in place in the position shown in Figure 4, thereby completing step 40 of Figure 6.

In the preferred embodiment, the ball 26 is composed of a cured high density urethane foam. In the preferred embodiment, a formulation identified as IPS6168-20F (20 pounds per cubic foot) made by Innovative Polymer Systems, Inc. of Ontario, California, has been found to achieve optimum results. The material is supplied in the form of two liquid components which are stable until mixed. Appropriate quantities of each component are measured, using 40 parts by weight of component A and 60 parts by weight of component B. These components should be at approximately 80°F. The components are mixed, and a chemical reaction begins. It is important that the components be thoroughly mixed. During an early phase of the reaction, the mixture remains pourable, and at that stage the mixture is poured into a pour opening 42 in the upper part 30 of the mold.

The reaction continues after the mixture has been poured into the mold, and the mixture begins to foam, thereby expanding. The plug 32 of Figure 4 is not set in place until the air has escaped from the mold and foam begins to flow from the pour opening 42. At that point, the plug 32 is installed in the pour opening 42. This completes step 44 of Figure 6. Thereafter, it takes from 15 to 30 minutes for the foam to set up so that the ball 26 will hold its shape when the mold is opened. During this time, the mold should be maintained at a temperature of 80°. At the end of this time, the mold is opened and the ball is removed from it. At this time it is desirable to remove any mold marks from the ball. Thereafter, the ball is allowed to rest at room temperature for 24 to 48 hours, during which the curing of the material is completed.

The same process can also be used to produce a tethered softball (which is larger than a baseball). The invention is the process, not the name given to the product.

The inventor used simple equipment to evaluate the durability of the article produced by the above process. A clay target throwing machine, normally used in trap

shooting, was used. The target slinger was replaced by a metal bat, which created a force equal to that employed by a college level baseball player. The tether was attached to a stand, and a length of rubber tubing extended vertically from the stand, surrounding the tether and supporting the ball. The length of the rubber tubing was sufficient to maintain the tether under a small degree of tension, so that after each hit, the ball returned to its original position resting on the upper end of the rubber tube. Using this test setup, the ball was repeatedly struck by the bat.

As a result of this testing, it was found that the ball and tether produced by the above process had a life expectancy in excess of 5000 hits.

The testing also demonstrated that the sound produced when a bat strikes the ball varies with the density of the cured urethane foam. The most realistic sound resulted when the density was between 18 and 32 pounds per cubic foot.

Thus, there has been described a process for manufacturing an article that includes a robust ball that is robustly attached to a robust tether. The tether is a piece of commercially-available elastic shock cord having a central core of numerous strands of rubber surrounded by an inner cover of braided nylon and an outer cover of braided nylon. An anchor is formed at one end of the elastic cord by folding it back upon itself and securing the portion folded back by means of a hog ring or by lashing it with cord. A mold having a spherical cavity is used to form the ball, and the anchor portion of the cord is placed in the mold before the mold is filled. A two component mixture is used, which initially is liquid. The liquid is poured into the mold, and as the reaction progresses, a foam is formed. Preferably a high density 100 percent urethane foam. After the foam has set up, the article is removed from the mold and allowed to cure at room temperature.

The foregoing detailed description is illustrative of one embodiment of the invention, and it is to be understood that additional embodiments thereof will be obvious to those skilled in the art. The embodiments described herein together with those additional embodiments are considered to be within the scope of the invention.

What is claimed is: